Software management plan

As an open-source project developed over almost 10 years, Bonsai has well-established management practices built around the community of over 7000 users. The open-source license used by Bonsai itself is the MIT license, thus there are no copyright and licencing restrictions.

Software repository. The source code for the core system and the majority of extension packages is hosted on GitHub (github.com/bonsai-rx). The documentation, including learning materials and all relevant community links are published in a publicly accessible website at bonsai-rx.org.

Software deployment. Package installation and updates are supported by standalone package management software included within the core Bonsai distribution and hosted in a shared centralized and curated repository. This ensures that bugfixes and enhancements are made easily available but also importantly allows for reproducible deployment of user environments to ensure working experiments are not disrupted by changes in the system. Large-scale experimental projects such as the International Brain Laboratory have leveraged this capability of Bonsai to standardize data acquisition and control software across dozens of laboratories around the world.

Software will be released to the Bonsai package manager using continuous integration tools which will build the source code, run any unit and integration tests, and validate the generated package. Credentials for release will be granted initially by Dr. Gonçalo Lopes, Head Engineer at Neurogears and the current curator of the Bonsai official package feed, but might be expanded to other team members after training.

Community technology previews are made available through the package manager, providing early adopters the possibility of opting-in to the latest features prior to making them generally available. This allows for the community to help identify bugs and report issues with new features on GitHub, thereby distributing bug reporting and triage and overall improving the quality of stable releases.

Software testing and quality control. The core compiler and IDE is extensively tested, and also takes advantage of a strong type system to greatly reduce bugs at compile-time. A set of best practices for leveraging this infrastructure for building new packages is in place. The software engineers recruited to this project will work with our collaborators at NeuroGEARS Ltd, to strengthen and maintain these practices. Once fully familiar with the Bonsai core architecture they will participate in review of pull requests and other code contributions.

A select group of Bonsai power users at UCL (SWC and GCNU) will beta-test machine-learning analysis tools for behavioural and neural datasets developed in the proposed work. They will provide early feedback on bug and suggest improvements to user experience.

Scientific Advisory Board (SAB). The role of the SAB is to oversee and advise on the development of new extensions and Machine Intelligence add-ons to the Bonsai. They will also advise on the opportunities to integrate Bonsai with existing () or emerging technology platforms or hardware(e.g. openEphys, UCLA miniscope, HARP). The SAB includes international experts in machine learning, behavioural sciences, systems neuroscience and hardware developers.

Feedback from the user community. A community user forum is available as a public Google Group with an active user base of more than 700 contributors (Figure 1f), and new questions and answers exchanged every day.

Summary of main outputs from the proposed enhancements to Bonsai ecosystem:

- Foreign programming language interface packages (each one will be an independent package distributed through the built-in Bonsai package manager), including those for MATLAB, Python and R.
- API and standard operators for Machine Intelligence
- Standard library of machine-learning analysis tools for behavior and neural physiology
- Documentation and examples